PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 0247.00017	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US03/10354	International filing date *(day/month/year)* 03 April 2003 (03.04.2003)	Priority date *(day/month/year)* 05 April 2002 (05.04.2002)
International Patent Classification (IPC) or national classification and IPC IPC(7): B08B 3/00 and US Cl.: 134/26, 1, 1.1, 1.3, 7, 10, 11, 21, 34		
Applicant BANERJEE, SOUVIK		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of ___ sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of report with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand 05 November 2003 (05.11.2003)	Date of completion of this report 01 September 2004 (01.09.2004)
Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer Mikhail Kornakov Telephone No. (571) 272-1700 Jean Proctor Paralegal Specialist

Form PCT/IPEA/409 (cover sheet)(July 1998)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US03/10354

I. Basis of the report

1. With regard to the **elements** of the international application:*

☒ the international application as originally filed.

☒ the description:
pages 1-12 as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____.

☒ the claims:
pages 13-15 , as originally filed
pages NONE , as amended (together with any statement) under Article 19
pages NONE , filed with the demand
pages NONE , filed with the letter of _____.

☒ the drawings:
pages 1-3 , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____.

☐ the sequence listing part of the description:
pages NONE , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____.

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination(under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in printed form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages NONE

☐ the claims, Nos. NONE

☐ the drawings, sheets/~~fig~~ NONE

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

** Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*
*** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US03/10354

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. STATEMENT

Novelty (N)	Claims 19 and 21	YES
	Claims 1-8 and 20	NO
Inventive Step (IS)	Claims NONE	YES
	Claims 1-21	NO
Industrial Applicability (IA)	Claims 1-21	YES
	Claims NONE	NO

2. CITATIONS AND EXPLANATIONS

Claims 1-18 and 20 lack novelty under PCT Article 33(2) as being anticipated by U.S. 5,377,705 to SMITH JR. et al .

Claims 1-21 meet the criteria set out in PCT Article 33(4), and thus criteria for industrial applicability because the subject matter claimed can be made or used in industry.

The claims disclose a process for the removal of contaminants from a substrate surface requiring precision cleaning, comprising the steps of applying a high vapor pressure liquid to the substrate surface and cryogenically cleaning the surface of the substrate to remove contaminants from the substrate surface. The same is disclosed at, inter alia, column 1, lines 31-39. It is noted that this concept is well known in the art and is also disclosed in the first sentence of the Summary of the Invention. The fact that the solvents are mixed is similarly disclosed ("carbon dioxide may be mixed with co-solvents"). Supercritical ozone dissolved in liquid or supercritical carbon dioxide or water is disclosed as an excellent solvent/oxidant for inorganic material. Column 1, line 19 et seq.

The currently claimed invention further discloses that the high vapor pressure liquid is selected from the group consisting of, inter alia, acetone which is disclosed. At his time it is unclear how the type of substrate acted upon by the method impacts the method steps which are being claimed, and in any case does not disclose a method step. Additionally, virtually every known material meets the limitation of semiconductor, metal or dielectric. A simultaneous application of ozone dissolved in liquid or supercritical carbon dioxide or water is a simultaneous application of solvent and initiation of cleaning.

As to the claim limitation that the reactive fluid contacts the surface for upto 20 minutes and removal of byproduct the same is disclosed at minutes at column 6, line 12 et seq. a five minute period is disclosed.

Intended particle size does not materially change the method steps. Since the same liquid(s) is disclosed inherently the high vapor pressure liquid will behave in the same manner as applicant discloses and will thus removes bulk water from the surface.

Claims 19 and 21 lack an inventive step under PCT Article 33(3) as being obvious over United States Patent No. 5,377,705 to Smith Jr. et al. The use of a purge gas is disclosed in Smith Jr. et al. Column 2, line 25 et seq. "According to a preferred method, the cleaning vessel is purged with a purge gas prior to introduction of the co-solvent." Therefore the Smith reference is deficient in that it fails to explicitly disclose using nitrogen or "Clean Dry Air". Purge gases are well known in the art, and are characterized by a lack of (or reduced level) of reactivity, and because of are most desirably low cost. Nitrogen and air are commonly used and recognized purge gases because of their low cost and, at least in the case of nitrogen verifiable purity. Similarly UV light is very well known as an ozone generation means, and ozone is well known as an effective agent in the cleaning of organics, such as photoresist. Similarly, plasma cleaning is commonly used in cleaning applications. It is noted that strictly speaking plasma is not usually regarded as a free radical initiator, but is used as the reactive specie.

Claims 19 and 21 lack an inventive step under PCT Article 33(3) as being obvious over United States Patent No. 5,377,705 to Smith Jr. et al. in view of United States Patent No. 6,306,564 to Mullee. Mullee makes explicit what Smith Jr. et al. left implicit, namely Mullee, in the context of a super-critical carbon dioxide precision cleaning system, discloses using air as a purge gas (column 3, lines 30-40) and plasma etching as a cleaning step is disclosed at column 2, line 29 et seq.

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Claim s 14 and 18 are objected to under PCT Rule 66.2(a)(iii) as containing the following defect(s) in the form or contents thereof: In claim 14 the abbreviation for Angstrom is an upper case delta, and in claim 18 the temperature is represented as 200EC instead of 200C. neither error is believed to be material to complete understanding of the claimed invention.